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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/076,443	02/19/2002	Atsuhiro Ohkawa	030662-082	9882

7590 08/04/2004

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EXAMINER	
HON, SOW FUN	

ART UNIT	PAPER NUMBER
1772	

DATE MAILED: 08/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/076,443	OHKAWA ET AL.	
	Examiner	Art Unit	
	Sow-Fun Hon	1772	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 May 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

Withdrawn Rejections

1. The 35 U.S.C. 112, 2nd paragraph and 103(a) rejections have been withdrawn due to Applicant's amendment dated 05/06/04.

New Rejections

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 112

3. Claim 12 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is unclear what is meant by the "minimum difference between the refractive index of the optically isotropic phase and that of the optically anisotropic phase of less than 0.05 along a direction in a surface plane of the film". If the term "minimum difference" were to be replaced by the term "maximum difference", it would justify the limitation of "less than 0.05", and it would describe the matching of the refractive indices along that direction in the surface of the plane of the film.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

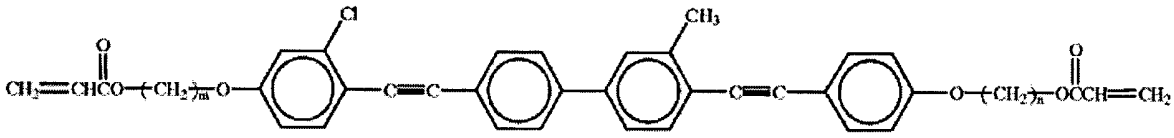
> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-5, 9-10, 13, 15, 20-21 are rejected under 35 U.S.C. 102(e) as being anticipated by Ichihashi (US 6,645,397).

The applied reference has a common assignee, Fuji Photo Film Co., Ltd., with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Ichihashi has an optical film (column 22, line 10) comprising a transparent support (light-transmitting substrate) (column 20, lines 20-25) and a polarizing layer which selectively transmits polarized light (polarized light transmission) (column 26, lines 5-10) and reflects or scatters other polarized light (reflective polarizing plate) (column 22, lines 55-60). The polarizing layer contains a liquid crystal compound which has a fixed alignment (orientation) (column 22, lines 30-35).

a-13



In the liquid crystal compound a-13 above, of Ichihashi, the substitituted aromatic ring on the left of the left C≡C group is Ar^1 of Applicant, the biphenyl aromatic group between the two C≡C groups is Ar^3 of Applicant, and the substituted aromatic ring on the right of the right C≡C group is Ar^2 of Applicant.

Applicant's formula (I) is shown below:

Ar^1-C≡C-Ar^3-C≡C-Ar^2

Regarding claims 1-5, liquid crystal compound a-13 of Ichihashi, on the previous page, teaches the Ar^1 = monovalent aromatic hydrocarbon group, Ar^2 = monovalent aromatic hydrocarbon group, and Ar^3 = divalent aromatic hydrocarbon group (claims 1-2) formed by connecting two groups thereof (claims 3-5), as defined by Applicant's specification (filed 02/19/02) (page 24, lines 10-15 and page 26).

Regarding claims 9-10, 15, Ichihashi teaches a binder resin for the liquid crystal compound (column 17, lines 1-10) and does not teach that the binder resin is optically anisotropic (birefringent). Ichihashi teaches that the liquid crystal compound a-13, on the previous page, has an optical anisotropy (birefringence Δn) of 0.2 to 0.5 (column 8, lines 28-38). The liquid crystal in the liquid crystal film is first polymerized (column 26, lines 1-5) which inherently causes phase separation from the binder resin. Thus the optical film inherently has an optically isotropic binder phase and an optically anisotropic liquid crystal phase (claims 9-10).

The binder can only bind if it forms the continuous phase. Thus the continuous phase is inherently the isotropic binder phase (claim 15).

Regarding claims 13, 20-21, liquid crystal compound a-13 of Ichihashi, on the previous page, has a polymerizable ethylene group (column 5, lines 20-25) (claim 13). Ichihashi teaches that the liquid crystal compound which has been aligned (oriented) is polymerized by exposing the film to light to fix the alignment (orientation) (column 22, lines 30-35) (claim 20). The light is ultraviolet (column 26, lines 1-5) (claim 21).

Claim Rejections - 35 USC § 103

6. Claims 1, 7, 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ichihashi.

Regarding claim 1, Ichihashi has been discussed above and teaches an optical film comprising a transparent support and a polarizing layer which selectively transmits polarized light and selectively reflects or scatters other polarized light, wherein the polarizing layer contains a liquid crystal compound with fixed alignment, represented by formula (I) of Applicant.

Regarding claim 7, Ichihasi teaches that a six-membered heterocyclic group is equivalent to a six-membered aromatic hydrocarbon group (column 33, lines 25-40) in the conjugated phenylacetylene skeleton. Thus the substitution of the six-membered aromatic hydrocarbon group with a six-membered heterocyclic group for Ar^2 is the result of routine experimentation. The aromatic groups are "monovalent" when they are on either end of the conjugated phenylacetylene, as defined by Applicant's specification (filed 02/19/02) (page 24, lines 10-15 and page 26).

Regarding claim 12, Ichihashi teaches a binder resin for the liquid crystal compound (column 17, lines 1-10) and does not teach that the binder resin is optically anisotropic (birefringent). Ichihashi teaches that the liquid crystal compound a-13 has an optical anisotropy (birefringence Δn) of 0.2 to 0.5 (column 8, lines 28-38) and that the large optical anisotropy (birefringence) is desired (column 2, lines 40-45). Therefore the combination of liquid crystal and binder, wherein the minimum difference between the refractive index of the optically anisotropic liquid crystal phase and that of the optically isotropic binder phase is 0.2 along the desired polarization plane, while the corresponding surface plane of the film which is perpendicular to the polarization plane has a corresponding maximum difference of less than 0.05, is the result of routine optimization obvious to one of ordinary skill in the art.

7. Claims 1, 9-12, 14-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ichihashi in view of Larson (previously cited US 5,751,388).

Regarding claim 1, Ichihashi has been discussed above and teaches an optical film comprising a transparent support and a polarizing layer which selectively transmits polarized light and selectively reflects or scatters other polarized light, wherein the polarizing layer contains a liquid crystal compound with fixed alignment, represented by formula (I) of Applicant.

Regarding claims 9-10, 14-15, Ichihashi fails to teach that the polarizing layer separates into an optically isotropic binder phase and an optically anisotropic liquid crystal phase.

Larson teaches that the methods for forming the polymer dispersed liquid crystal (PDLC), such as phase separation, are well known in the art (column 6, lines 20-25) (claims 9-

10). Thus the claimed mean particle (crystal) size of 0.01 to 1.0 μm is the result of routine experimentation, well known to one of ordinary skill in the art (claim 14).

Larson teaches an embodiment of the light scattering polarizing film (PSSE layer) wherein the optically anisotropic (birefringent liquid) crystals are aligned along an axis and embedded within an optically isotropic (non-birefringent) polymer matrix (column 8, lines 45-50). The term "matrix" is synonymous with the term "continuous phase". Thus the optically isotropic polymer phase is the continuous phase while the optically anisotropic liquid crystal phase is the discontinuous phase (claim 15).

Regarding claim 16, Ichihashi fails to teach that the optical film is stretched.

Larson teaches that the film is unaxially stretched (column 6, lines 30-35). The claimed amount of stretch of the film by ten times or less is the result of routine experimentation.

Regarding claim 11, Ichihashi fails to teach that the optical film has a polarizing plane perpendicular to a surface plane of the film, wherein the film at the polarizing plane has the maximum transmittance for all rays along the transmittance axis of more than 75% and the minimum transmittances for all rays along the non-transmittance axis of less than 60%.

Larson teaches that the polarized light scattering (PSSE) layer transmits approximately 90 % via the pass axis and 30 % via the rejection axis (column 7, lines 5-10), which respectively overlap the claimed range of maximum transmittance of all rays along the transmittance (pass) axis of more than 75% and the claimed range of minimum transmittance for all rays along the non-transmittance (rejection) axis of less than 60%.

Regarding claim 12, Ichihashi fails to teach that the optical film has the minimum difference between the refractive index of the optically isotropic phase and that of the optically anisotropic phase of less than 0.05 along a direction in a surface plane of the film.

Larson teaches that the difference between the refractive index of the optically isotropic phase (polymer matrix) and the refractive index of the optically anisotropic phase (LC) is less than 0.05 (matches) along a direction (ordinary or extraordinary) in a surface plane of the polymer dispersed liquid crystal film (PDLC structure) (column 6, lines 30-40).

Regarding claim 17-19, Ichihashi teaches that the optical film is used as a scattering (reflective) polarizing plate in a liquid crystal display (column 22, lines 50-60), but fails to teach that the optical film is combined with a polarizing plate (element) of light-absorbing type.

Larson teaches a liquid crystal display (LCD) in Fig. 1, on the next page, which comprises a liquid crystal cell (panel 10) and a pair of polarizing plates (15, 16) sandwiching the liquid crystal cell (panel 10), wherein the optical light scattering (pre) polarizing film (17) is provided between a backlight (13) and the polarizing plate (16) on the backlight side of the cell (column 4, lines 25-55). A liquid crystal cell which comprises a liquid crystal compound sealed between a pair of substrates having a transparent electrode and a pixel electrode as is notoriously well known in the art (claim 18).

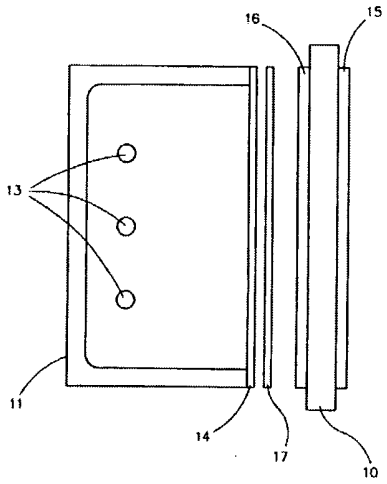
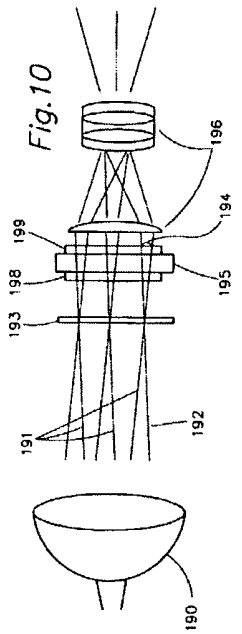


Fig. 1

The rear polarizer 198 in Fig 10 on the next page, of Larson, is of the light-absorbing type (column 13, lines 55-65), and the polarizing element of light scattering type (PSSE layer 193) has the axis having the polarizing plane giving the maximum transmittance for all rays, parallel to the transmittance axis of the polarizing element of light absorbing kind (output polarization rays of 193 match the pass-axis of the rear polarizer 198) (column 14, lines 1-5). Fig 10 on the next page, of Larson, shows that the polarizing plane of the light scattering polarizing element 193 has a polarization plane perpendicular to the surface plane of said element 193 since the transmitted rays are perpendicular to the surface plane of the element. Comparing Fig. 1 and Fig. 10, backlight 13 is analogous to backlight 190, light scattering polarizing element 17 is the same as light scattering polarizing element 193, rear polarizing plate 16 is analogous to rear absorbing polarizing plate 198, and liquid crystal cell (panel) 10 is analogous to light valve 195.



Ichihashi teaches that the optical film may be used as a scattering (reflective) polarizing plate in a liquid crystal display (column 22, lines 50-60) and that the liquid crystal compound a-13 has large optical anisotropy (birefringence) (column 2, lines 55-60) which improves the scattering (reflectance) of the optical film (column 2, lines 45-50).

Therefore it would have been obvious to one of ordinary skill in the art to have used the liquid crystal compound with large optical anisotropy of Ichihashi as the liquid crystal in the polymer dispersed liquid crystal taught by Larson in order to obtain a polarized light scattering element with the desired polarized light scattering.

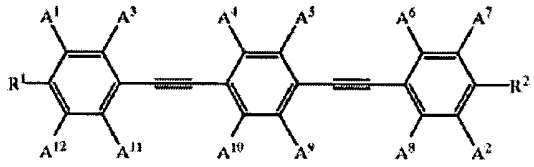
8. Claims 6, 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ichihashi as applied to claims 1, 12 above, and further in view of Sekine et al. (previously cited US 6,149,837).

Ichihashi has been discussed above and teaches an optical film comprising a transparent support and a polarizing layer which selectively transmits polarized light and selectively reflects or scatters other polarized light, wherein the polarizing layer contains a liquid crystal compound with fixed alignment, represented by formula (I) of Applicant.

Ichihashi fails to teach cyano (claim 6) or hydroxyl group (claim 8) substitution of the aromatic rings.

Sekine et al. has an optical film comprising a polymer dispersed liquid crystal element layer (column 1, lines 10-20), and is directed to a liquid crystal display (column 3, lines 1-5).

(1)



In the formula, A^1 to A^{12} each independently represent a hydrogen atom, a fluorine atom, or an alkyl group having 1 to 10 carbon atoms, and at least one is an alkyl group (provided that, in A^1 to A^{12}, the cases are excluded where both of A^1 and A^2 are methyl groups at the same time, while the others are hydrogen atoms, and where both of A^7 and A^{12} are methyl groups at the same time, while the others are hydrogen atoms); R^1 and R^2 each independently represent a hydrogen atom, a fluorine atom, a cyano group, a 4-R^3-(cycloalykyl) group, a 4-R^3-(cycloalkenyl) group, or a R^4—$(O)_q$ group (where R^3 represents a hydrogen atom, a linear or branched alkyl group having 1 to 12 carbon atoms which may be substituted by fluorine, a linear or branched alkenyl group having 2 to 12 carbon atoms which may be substituted by fluorine, or a linear or branched alkynyl group having 2 to 12 carbon atoms which may be substituted by a fluorine

The compound above ,of Sekine et al., with high refractive index anisotropy (abstract) is analogous to the compound a-13 of Ichihashi and to Applicant's formula (I) in terms of the conjugated phenylacetylene skeleton. In Sekine et al., R^1 and R^2 each independently represent a hydrogen atom or a cyano group (column 3, lines 10-35).

Sekine et al. discloses prior art wherein the hydrogen atom on the aromatic ring is substituted by a halogen atom in order to improve compatibility with the other materials in the polarizing layer but at the expense of refractive index anisotropy (column 2, lines 50-65). Therefore it would have been obvious to one of ordinary skill in the art to have introduced cyano or hydroxyl group substitution to the liquid crystal compound of Ichihasi et al., in order to provide the desired refractive index anisotropy, or compatibility, or a balance of the two, as taught by Sekine et al.

9. Claims 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ichihashi as applied to claims 1, 12 above, and further in view of Shen et al. (US 5,672,296).

Ichihashi has been discussed above and teaches an optical film comprising a transparent support and a polarizing layer which selectively transmits polarized light and selectively reflects or scatters other polarized light, wherein the polarizing layer contains a liquid crystal compound with fixed alignment, represented by formula (I) of Applicant.

Ichihashi teaches that the fixing of the alignment of the liquid crystal is done by polymerizing and crosslinking (cured) via light irradiation (column 22, lines 30-35), but fails to teach that the alignment is fixed by crosslinking of boric acid.

Shen et al. teaches a polarizing layer (film) which comprises aromatic liquid crystalline polymer whereby the crosslinking agent is boric acid as is well known to those skilled in the art (column 2, lines 55-60) (claim 22). The film is immersed in an aqueous solution of the boric acid (column 5, lines 25-35) (claim 23).

Therefore it would have been obvious to one of ordinary skill in the art to have used boric acid solution immersion in place of the light irradiation in crosslinking (curing) process of

Ichihashi in order to obtain an optical polarizing film with the desired fixed alignment of liquid crystal.

Response to Arguments

10. Applicant's arguments with respect to claims 1-19 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication should be directed to Sow-Fun Hon whose telephone number is (571)272-1492. The examiner can normally be reached Monday to Friday from 10:00 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Harold Pyon, can be reached at (571)272-1498. The fax phone number for the organization where this application or proceeding is assigned is (703)872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

S. Hon.

Sow-Fun Hon

07/30/04

HAROLD PYON
SUPERVISORY PATENT EXAMINER
1772

8/3/04